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And  $\sqrt{1,443}^2 = 2,082$ ; And  $2,082 - 1 = 1,082$   
 $= \frac{25b^2}{21c} - 1.$

Also  $vv = \frac{9^2}{4} = \frac{81}{16}$ ; And  $\frac{vv}{48} = \frac{81}{16 \times 64.3596} =$   
 $0.0786.$

Then  $1,082 \times 0.0786 = 0.084$  feet, the fall  
sought.

Which is about 1 inch; and is about half an  
inch more than the greatest fall observed by Mr.  
Labelye.

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LXIV. *An Account of the Earthquake in  
the West Parts of Cornwall, July 15th  
1757. By the Rev. William Borlase,  
M. A. F. R. S. Communicated by the Rev.  
Charles Lyttelton, LL.D. Dean of Exe-  
ter, F. R. S.*

Read Jan. 26.  
1758. **O**N Friday the 15th of July, 1757.  
a violent shock of an earthquake  
was felt in the western parts of Cornwall.

The thermometer had been higher than usual,  
and the weather hot, or calm, or both, for eight  
days before; wind east and north-east. On the  
14th in the morning, the wind shifting to the south-  
west, the weather calm and hazy, there was a  
shower. The afternoon hazy and fair, wind north-  
west. The barometer moderately high, but the  
mercury remarkably variable.

On the 15th in the morning, the wind fresh at north-west, the atmosphere hazy. Being on the sands, half a mile east of Penzance, at 10 A.M. near low water, I perceived on the surface of the sands a very unusual inequality: for whereas there are seldom any unevennesses there, but what are made by the rippling of the water, I found the sands, for above 100 yards square, all full of little tubercles (each as large as a moderate mole-hill), and in the middle a black speck on the top, as if something had issued thence. Between these convexities were hollow basons of an equal diameter. From one of these hollows there issued a strong rush of water, about the bigness of a man's wrist, never observed there before nor since.

About a quarter after six, P. M. the sky dusky, the wind being at west north-west, it fell quite calm. At half past six, being then in the summer-house at Keneggy, the seat of the Hon. J. Harris, Esq; near Penzance, with some company, we were suddenly alarmed with a rumbling noise, as if a coach or waggon had passed near us over an uneven pavement; but the noise was as loud in the beginning and at the end, as in the middle; which neither the sound of thunder, or of carriages, ever is. The fash-cafements jarred: one gentleman thought his chair moved under him; and the gardener, then in the dwelling house (about an hundred yards distant from us) felt the stone pavement of the room he was in move very sensibly.

In what place the shock began, and whether progressive or instantaneous in the several places where it was felt, is uncertain, for want of accurately determining the precise point of time in distant places.

The

The shock was not equally loud or violent. Its extent was from the isles of Scilly eastward as far as Liskeard, and towards the north as far as Camel-ford ; thro' which district I shall trace it, according to the best informations I could procure.

In the island of St. Mary, Scilly, the shock was violent. On the shores of Cornwall, opposite to Scilly (in the parish of Senan, near the Land's-end) the noise was heard like that of a spinning-wheel on a chamber-floor. Below stairs there was a cry, that the house was shaking ; and the brass pans and pewter rattled one against another in several houses in the same parish. In the adjoining parish of St. Just, two young men being then swimming, felt a strong and very unusual agitation of the sea. In the town of Penzance, in one house the chamber-bell rung ; in another the pewter plates, placed edgeways on a shelf, shifted, and slid to one end of the shelf ; and it was every-where perceived more or less, according as people's attention was engaged.

At Trevailer, the seat of William Veale, Esquire, about two miles from Penzance, the noise was heard, and thought at first to be thunder : the windows shook, and the walls of the parlour, where Mr. Veale sat, visibly moved. The jarring of the windows continued near half a minute ; but the motion of the walls not quite so long : and some masons, being at work on a contiguous new building, the upright poles of the scaffolds shook so violently, that, for fear of falling, they laid hold on the walls, which, to their still greater surprize, they found agitated in the same manner. And a person present, who was at London at the time of the two shocks in the

the year 1751, thought this shock to resemble the second, both in degree and duration (1).

At Marazion, the next market-town east of Penzance, the houses of several persons shook to that degree, that people ran out into the street, lest the houses should fall upon them.

In the borough of St. Ives, on the north sea, six miles north of Penzance, the shock was so violent, that a gentleman, who had been at Lisbon during several shocks, said, that this exceeded all he had met with, except that on the 1st of November 1755, so fatal to that city.

At Tehidy, the seat of Francis Basset, Esq; the rooms shook, and the grounds without doors were observed to move. The shock was felt sensibly at Redruth, St. Columb, Bodman, &c. along to Carmelford, which is about 90 miles from the isle of Scilly. From Marazion eastward it was felt at several places in like manner, as far as Lostwythel; but at Liskerd, about ten miles east of Lostwythel, it was but faintly perceived, and that by a few persons. It was still less sensible at Loo and Plymouth, "scarcely sufficient to excite curiosity or fear" (2).

The times of its duration were various. At Kenevvy we thought the noise could not have lasted above six seconds; at Trevailer, not two miles distant to the west, it was thought to have lasted near half a minute; in the parish of Gwynier half a minute; at Ludgvan, three miles east of Penzance, the noise was rather longer than half a minute; but

(1) Letter from William Veale, Esq;

(2) Letter from John Trehawk, Esq;

the shaking felt in the garden, and observed in the houses, short and momentary. In Germo great Pin-work, seven miles east of Penzance, it lasted only a few seconds; but in the isles of Scilly it was computed at 40 seconds.

Thus was this earthquake felt in towns, houses, and grounds adjacent; but still more particularly alarming in our mines, where there is less refuge, and consequently a greater dread from the tremors of the earth.

In Carnorth adit, in the parish of St. Just, the shock was sensibly felt 18 fathom deep; in the mine called Boscadzhill-downs, more than 30 fathom.

At Huel-rith mine, in the parish of Lannant, people saw the earth move under them, first quick, then in a slower wavy tremor; and the stage-boards of the little winds or shafts 20 fathom deep were perceived to move.

In Herland mine, commonly called the Manor, in the parish of Gwynier, the noise was heard 55 and 60 fathom deep, as if a studdle (3) had broke, and the deads (4) were set a running. It was nothing like the noise of thunder.

In Chace-water mine the same noise was heard, at least 70 fathom under the surface.

At Huel-rith mine, near Godolphin, the noise was seemingly underneath. I felt (says the director of the mine) the earth move under me with a prodigious swift, and apparently horizontal tremor: its continuance was but for a few seconds of time,

(3) A timber support of the deads.

(4) Loose rubbish and broken stones of the mine.

not like thunder, but rather a dull rumbling even found, like deads running under ground. In the smith's shop the window-leaves shook, and the flattening of the house cracked. The whim-house shook so terribly, that a man there at work ran out of it, concluding it to be falling. Several persons then in the mine, working 60 fathom deep, thought they found the earth about them to move, and heard an uncommon noise: some heard the noise, and felt no tremor; others, working in a mine adjoining called Huel-breag, were so frightened, that they called to their companions above, to be drawn up from the bottoms. Their moor-house was shaken, and the padlock of their candle-chest was heard to strike against the staples. To shew, that this noise proceeded from below, and not from any concussion in the atmosphere above, this very intelligent captain of the mine (5) observes, from his own experience, that thunder was never known to affect the air at 60 fathoms deep, even in a single shaft pierced into the hardest stone; much less could it continue the sound thro' such workings as there are in this mine, impeded in all parts with deads, great quantities of timber, various noises, such as the rattling of chains, friction of wheels and ropes, and dashing of waters; all which must contribute to break the vibrations of the air as they descend: and I intirely agree with this gentleman's conclusion, that thunder, or any other noises from above in the atmosphere, could not be heard at half the depth of this mine. This therefore could be no other than a real tremor of the earth,

(5) Mr. J. Nantcarrow.

attended

attended with a noise, owing to a current of air and vapour proceeding upwards from the earth.

I do not hear of any person in those parts, who was so fortunate as to be near any pool or lake, and had recollection enough to attend to the motion of the waters ; but it may be taken for granted, that during the tremors of the earth the fluids must be more affected than the solids : nay, the waters will apparently be agitated, when there is no motion of the earth perceptible, as was the case of our ponds and lake-waters in most parts of Britain on the 1<sup>st</sup> of November 1755. Whence this happens is difficult to say : whether the earth's bosom undergoes at such times a kind of respiration, and alternately emits and withdraws a vapour thro' its most porous parts sufficient to agitate the waters, yet not sufficient to shake the earth ; or whether the earth, during the agitation of the waters, does rock and vacillate, tho' not so as to be sensible to man ; is what I shall leave to future inquiry.

Earthquakes are very rare in Cornwall. This was but of short duration, and did no harm any-where, as far as I can learn ; and it is to be hoped not the sooner forgotten for that reason ; but rather remembered with all the impressions of gratitude suitable to an incident so alarming and dangerous, and yet so inoffensive.